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Proposals for the Porcelain Electric

Insulator Industry

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SOME SUGGESTIONS FOR THE PORCELAIN  
ELECTRICAL INSULATING INDUSTRY

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The porcelain electrical insulating industry has been established for more than 30 years in our country; its output — quantity and quality — has been good, with its factories distributed mostly in Fu-shen, Dairen, Nankin, Soochow, Shanghai, and Hunan Province.

Porcelain insulators are used for the following purposes:

1. Telecommunications, such as telegraphy, telephone, and others.
2. Power plants use porcelain as insulators, such as pin-shape insulators, porcelain spacers, holders, and as connectors in wiring and various types of electric motors and transformers.
3. Porcelain insulators are also used in electric lighting installations such as switchboards, terminals, lamp terminals, fuse boxes, knobs, caps, etc.
4. Porcelain material is used especially in
  - (a) high frequency radio stations
  - (b) in combustion engines (as heat-proof insulators)
  - (c) in insulating devices for high-voltage transformers

China has been producing porcelain products for all these

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uses except for those listed under Number 4, above. The history of the porcelain electrical insulating industry in China may be divided into two stages: the first stage was one of imitation and experimentation, and the second stage was one of development. Experiment and imitation marked the beginning of this industry, when China began establishing modern telegraphy and power plants in large cities; porcelain products were principally used at that time for replacing worn-out pieces of insulation in the western-made and Japanese-made installations. Since it was an industry founded by imitation, its products encompassed a great variety of items without uniform standards. However, the porcelain insulating industry has grown gradually and steadily since 1930 as a result of the expansion in electric power transmission and the improvement in electrical installations. During that period China needed a wide variety of electrical equipment and materials, for instance, porcelain insulators for 6,600 volts and up. The porcelain industry produced on an experimental basis insulators that would withstand pressures as high as 33,000 volts. Although these high-voltage insulators are not of perfect quality, the porcelain industry has now learned the technique and has laid the foundation for future development in this respect. But before the liberation the business aspect of the porcelain industry was not successful because of capitalist oppression.

After the liberation, China began industrial planning. Since China now attempts to supply industrial goods herself instead of buying them from abroad, the porcelain insulating in-

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dustry has become a center of attention; not only will it be restored to its previous scale of operation, but it will also be developed into a modern industry. In fact, there are at present many factors favorable to the growth of the porcelain industry. First of all, its products are needed very much by the power transmission industry, an industry that has preference above all others. Second, its raw materials can be procured at home without relying on foreign imports. Third, most of the principal equipment it needs can be produced by China. Hence, the porcelain insulating industry can be developed to the widest extent if we really work hard.

### CERTAIN PROBLEMS CONFRONTING THE INDUSTRY

#### 1. Lack of Uniformity in Products

Because the porcelain industry entered production by imitating the products of other countries, highly unstandardized products are still in use by consumers. Thus, the porcelain factories are still manufacturing a great variety of products without any uniformity at all. This results in a great waste.

#### 2. Lack of Initiative in Adopting Uniform Standards

Although the prosperity of the porcelain industry depends largely on the power transmission industry and the electrical machine manufacturing industry, the porcelain industry may improve its own position by taking the initiative in the adoption of uniform standards for its products and introducing them to its

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customers.

### 3. Need for Improving Techniques

China has solved the technical problem of producing high-voltage transformers and other types of electrical equipment. The only limitation in this respect is the supply of high-quality porcelain insulators; if the quality of insulation materials is improved, the production of high-voltage electrical machinery can be increased as a consequence. For instance, if the porcelain industry can supply insulators of 33,000-volt capacity, we can produce 33,000 generators. This is why the porcelain industry should improve its production techniques.

### 4. Need for Careful Study of the Design of Goods Ordered

Because some of the clients do not quite understand the nature of insulation materials, they do not always submit correct designs with their orders. Consequently it sometimes happens that blueprints drawn up by the factory, and sometimes the finished products based upon them, are unfit for use. Henceforth, the porcelain factories should make a careful study of the orders and designs setting forth their technical specifications, and make certain to draw up correct blueprints. This is the only way the industry can improve the quality of its products.

Apparently all these problems arose from the fact that the porcelain industry is a comparatively new industry and has had little time to introduce scientific methods. However, because

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it is an infant industry, it should be much easier to make all the necessary changes; if the situation can be remedied soon, the industry will be able to avoid the common mistakes such as disorder, uncoordination, and wasteful methods which characterize the industries in capitalist countries.

### SUGGESTIONS FOR IMPROVING PRODUCT QUALITY

#### 1. Do not Determine Production by Voltage

Because electrical power transmission has arrived at a stage of perfection by employing all the necessary safety devices, use of electricity is very safe, and the supply of electricity is unlikely to be interrupted by natural causes such as thunderstorms. Thus an insulation standard (Insulation Lee) has been developed and applied to the manufacture of insulators. It is, however, different from the voltage-in-use standard. The insulation standard is a unique standard applied to all the electrical machines and instruments used under the same power system. In other words, all the electrical machines and instruments using the same power system must employ the same insulation standard. If one instrument uses a lower insulation standard, it receives less protection — such as that given by the weaker link in a chain; however, the use of too high an insulation standard in such a machine or instrument will make its operation uneconomical. Besides, it won't work if insulation is too high. Not only machines and instruments, but other devices such as lightning conductors,

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should as well use the same standard under the same system. However, if we use the voltage-in-use standard, we will not be able to have the advantages the insulation standard offers. The reasons for this are as follows:

1. Under the same voltage, insulation standards vary according to whether or not the power lines have ground connections. Consequently, if the voltage-in-use standard is applied, we must use insulation materials of varying standards, and this becomes uneconomical.

2. If the voltage-in-use standard is employed, then we must use high-resistance insulation materials for long-distance transmission lines since their voltage is subject to sudden fluctuation.

3. Electrical current passing through wires varies in magnitude with certain characteristics of the wire. When the magnitude is large, voltage will increase to very high extent at the moment the current flow is interrupted. Consequently, this type of transmission line needs higher insulation resistance.

Thus we can see that if we adopt the voltage-in-use standard for determining the resistance of insulation materials, we must use materials of varying resistances; this would result in some instances in the insulation standard being too high, which is wasteful, and in other instances it would be too low, which is dangerous. For this reason, producers in America and Europe discard the voltage-in-use standard for determining specifications in insulation mater-

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ials and use other measurements such as top voltage resistance, dry flashover voltage, wet flashover voltage. Circuit designers and electric motor manufacturers may follow these standards instead of being tied by a rigid voltage standard. This is more scientific, safer, and more economical. The statistical references for the above-mentioned standards are very valuable in determining the installation of indoor and outdoor insulation devices. In this transition stage, we may use the voltage-in-use standard for reference, but should not be rigidly bound by its use.

### 2. Establish a High-Voltage Laboratory

Only by testing their reaction in a high-voltage laboratory can we discover the actual quality of the products. But few porcelain factories have laboratories, and those having them are not equipped with high-voltage testing facilities. It would seem feasible for several plants to set up a high-voltage laboratory for joint use.

### 3. Simplify and Rationalize Product Standards

On the basis of actual needs, we should re-classify the products formerly manufactured according to the voltage-in-use standard into a few categories in terms of insulation standards and determine their top voltage resistance; these new categories will be used as standards for further simplification and unification of the product standards.

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### 4. Standardize Product Sizes and Designs

When we have established quality standards, we should gradually unify the sizes and designs of the products manufactured by different plants; for after the products reach a certain quality level, it would be easier to introduce uniformity into their sizes and designs. After the product sizes and designs become uniform, we then can work out a catalogue covering all insulators produced in the nation.

### 5. The Porcelain Insulating Industry Should Lead the Electric Motor Industry

The electric motor industry should precede other industries, but the porcelain industry should precede it. This is because if the porcelain industry can successfully produce high-voltage insulating materials, the electric motor industry will be able to develop at greater speed, since it can then obtain its most needed insulating materials immediately and become therefore more efficient in designing. Therefore, the porcelain industry should devote its whole effort to improving its product quality -- particularly the quality of insulating materials for 33,000 and 66,000 volt circuits.

Advance of the porcelain industry depends largely on mutual cooperation among the individual companies of that industry, as well as on the demand for the use of its products. What has been mentioned above is but this writer's personal opinion. He hopes that the readers will give him their opinion on this article.

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